

CLAIMS

1. Greenhouse (1) comprising a structure (2) delimiting a growing environment (3), and an air humidifier (10), the greenhouse being characterized in that the said humidifier (10) comprises at least one exchange element (15) having a semi-permeable membrane (16), which allows water vapour to pass between opposite sides (17, 18) of the membrane if there is a vapour pressure gradient between the said sides, and in that the greenhouse also comprises first and second supply means (11, 12) for bringing a flow of water (13) and a flow of air (14) respectively into contact with the said opposite sides of the membrane.

15 2. Greenhouse according to Claim 1, characterized in that the said first supply means (11) comprise a hydraulic circuit (25) for bringing the said flow of water (13) into contact with a first side (17) of the membrane (16).

20 3. Greenhouse according to Claim 1 or 2, characterized in that the said flow of water (13) is a flow of sea water.

4. Greenhouse according to one of Claims 1 to 3, characterized in that the said second supply means (12) 25 comprise forced ventilation means (29) for bringing the

said flow of air (14) into contact with a second side (18) of the membrane (16) and introducing the humidified air (30) leaving the said humidifier (10) into the greenhouse.

5 5. Greenhouse according to one of the preceding claims, characterized in that the said humidifier (10) comprises a plurality of exchange elements (15), each exchange element (15) being delimited by a portion of semi-permeable membrane (16) interposed between the said 10 flow of water (13), circulating within the exchange element (15), and the said flow of air (14), which is in contact with the exterior of the exchange element (15).

6. 6. Greenhouse according to Claim 5, characterized in that the said semi-permeable membrane (16) is shaped 15 in such a way as to form a plurality of compartments (21) constituting corresponding exchange elements (15), the compartments (21) having the said flow of water (13) running within them and having the said flow of air (14) in contact with their exteriors.

20 7. Greenhouse according to one of the preceding claims, characterized in that it comprises a condenser (35) for condensing the water vapour present in the humidified air (30) introduced into the greenhouse and for obtaining condensate (36).

25 8. Greenhouse according to Claim 7, characterized

in that the said condenser (35) and the said humidifier (10) are positioned at opposite ends of the greenhouse, forced ventilation means (29, 52) being provided to keep the air in forced circulation between the said ends of
5 the greenhouse.

9. Greenhouse according to Claim 7 or 8, characterized in that the said condenser (35) is connected to irrigation means (55) for distributing the condensate (36) to the plants placed in the greenhouse.

10. Greenhouse according to one of Claims 7 to 9, characterized in that it comprises recirculation means (53) for recirculating the air leaving the condenser (35) and supplying it to the humidifier (10).

11. Greenhouse according to one of Claims 7 to 10,
15 characterized in that the condenser (35) comprises at least one heat exchange element (37) between the humidified air (30) taken from the greenhouse and a cooling fluid (38) having a temperature lower than the temperature of the humidified air (30) within the
20 greenhouse.

12. Greenhouse according to Claim 11,
characterized in that it comprises a branch circuit (41)
for taking the said cooling fluid (38) from the said
flow of water (13) up-line from the said humidifier
25 (10).

13. Method of cultivation under glass,
characterized in that it comprises the steps of:

- providing a greenhouse (1) with an air humidifier (10) comprising at least one exchange element (15)
- 5 having a semi-permeable membrane (16) which allows water vapour to pass between opposite sides (17, 18) of the membrane if there is a vapour pressure gradient between the said sides;
- humidifying a flow of air (14) by the exchange of
10 water vapour between a flow of water (13) and the said flow of air, the flow of air and the flow of water being brought into contact with opposite sides (17) and (18) respectively of the membrane (16);
- introducing the humidified air (30) leaving the
15 humidifier (1) into the greenhouse.

14. Method according to Claim 13, characterized in that it comprises a step of causing a forced circulation of the air in the greenhouse.

15. Method according to Claim 13 or 14,
20 characterized in that the said flow of air (14) is supplied to the humidifier (10) with a vapour pressure lower than the vapour pressure of the said flow of water (13).

16. Method according to one of Claims 13 to 15,
25 characterized in that the said flow of water (13) is

supplied to the said humidifier (10) at a temperature lower than the temperature of the said flow of air (14).

17. Method according to one of Claims 13 to 16, characterized in that the said flow of water (13) is a
5 flow of sea water.

18. Method according to one of Claims 13 to 17, characterized in that it comprises a condensation step, in which the water vapour present in the humidified air (30) introduced into the greenhouse is condensed in a
10 condenser (35) to produce condensate (36).

19. Method according to Claim 18, characterized in that the said condensation step comprises a step of heat exchange between the humidified air (30) taken from the greenhouse and a cooling fluid (38) having a temperature
15 lower than the temperature of the said humidified air.

20. Method according to Claim 19, characterized in that the said cooling fluid (38) is taken from the said flow of water (13) up-line from the said humidifier (10).

20 21. Method according to one of Claims 18 to 20, characterized in that the said humidification step and the said condensation step are carried out in an essentially continuous and simultaneous way at opposite ends of the greenhouse.

25 22. Method according to one of Claims 18 to 21,

characterized in that it comprises a step of irrigating the plants placed in the greenhouse with the condensate.

23. Method according to one of Claims 18 to 22, characterized in that it comprises a recirculation step, 5 in which the air leaving the condenser (35) is collected and supplied to the humidifier (10).

24. Method according to one of Claims 18 to 23, characterized in that the air leaving the condenser (35) is sent to cool a roof (6) of the greenhouse.